FIG. 4 shows examples of ablation patterns which will cause sclera expansion and increase the accommodation of the presbyopic patient. As shown in FIG. 4A, line patterns are conducted between circles **16** and **17** which have diameters of about 8–11 mm and 12–15 mm, respectively. The width of the ablated lines are about 0.1–0.5 mm with a depth of 80%–90% of the sclera. Eight (8) lines are shown in FIG. 4A as an example but it can be more or less without departing from the spirit and scope of the invention. Enhancement may be performed by adding more ablation lines. FIG. 4B shows a ring pattern with a diameter **18** of about 12–14 mm. A two-ring pattern **19** is shown in FIG. 4C where two circles have diameters of about 10 mm and 12 mm, respectively. Another example of an ablation pattern is shown in FIG. 4D where the ablation laser is focused to a round spot **20** of about 0.1–0.5 mm in diameter and scanned over the sclera area to form an eight spot symmetric ring which has a diameter of about 12–14 mm. In all the above described ablative patterns, the coagulative laser described in FIGS. **1** and **2** simultaneously deliver these patterns such that the sclera tissue may be coagulated as the tissue is being ablated. The preferred spot sizes of the coagulative lasers are larger than that of the ablative laser so that the alignment of the coagulative laser is not critical.

Another embodiment of controlling the ablation area of the sclera area is to use a metal mask which has a plurality of slits each having an approximate dimension of 0.1–0.3 mm×3.0–5.0 mm. Both of the ablative and coagulative lasers will scan over the mask which is placed on the corneal surface to generate the desired slit pattern on the sclera. In this embodiment using a mask, the small laser spot sizes of 0.1 mm, which may be difficult to achieve, are not needed in order to generate the slit size on the cornea. Laser spot sizes of 0.2–1.0 mm will generate the desired ablation dimension on the sclera after scanning over the mask. Furthermore, the embodiment of using a mask will not require a precise stability of the laser beam path onto the corneal surface. Without using a mask, both the exact laser beam spot size and its stability in propagating would be essential.

Another embodiment of sclera expansion of the present invention is to use diamond knife for the incision of the sclera tissue in the patterns described in FIGS. 4A, 4B and 4C where the coagulation laser is simultaneously applied onto the cut tissue to prevent bleeding. The incision depth should be about 80% to 90% of the sclera thickness in order to achieve the effects of sclera expansion. Accordingly, the pre-operative measurement of the sclera thickness is essential for the knife incision procedure and surgeon's skill is more important than that of using an ablative laser, in which the ablation depth of the sclera tissue is well controlled by the numbers of scanning lines in a given pattern. We are able to calibrate the ablation rate of various lasers on the sclera tissue by comparing the clinical data and that of the selected materials including a PMMA plastic sheet.

The invention having now been fully described, it should be understood that it may be embodied in other specific forms or variations without departing from the spirit or essential characteristics of the present invention. Accordingly, the embodiments described herein are to be considered to be illustrative and not restrictive.

I claim:

**1**. A laser beam ophthalmological surgery method for treating presbyopic in a patient's eye by ablating the sclera comprising the steps of:

selecting a pulsed ablation laser having a pulsed output beam of predetermined wavelength;

selecting a beam spot controller mechanism for reducing and focusing said selected ablative laser's output beam onto a predetermined spot size on the surface of the cornea;

selecting a scanning mechanism for scanning said ablative laser output beam;

coupling said ablative laser beam to a scanning device for scanning said ablative laser over a predetermined area of the corneal sclera; and

controlling said scanning mechanism to deliver said ablative laser beam in a predetermined pattern in said predetermined area onto the surface of the cornea to photoablate the sclera tissue outside the limbus, whereby a presbyopic patient's vision is corrected by expansion of the sclera.

**2**. A laser beam ophthalmological surgery method for treating presbyopic in a patient's eye by ablating the sclera in accordance with claim **1** in which the step of selecting a pulsed ablation laser includes selecting a pulsed ablative laser having a predetermined wavelength between 0.15–0.32 microns.

**3**. A laser beam ophthalmological surgery method for treating presbyopic in a patient's eye by ablating the sclera in accordance with claim **1** in which the step of selecting a pulsed ablation laser includes selecting a pulsed ablative laser having a wavelength between 2.6 and 3.2 microns.

**4**. A laser beam ophthalmological surgery method for treating presbyopic in a patient's eye by ablating the sclera in accordance with claim **1** in which the step of selecting a pulsed ablation laser includes selecting a solid state laser.

**5**. A laser beam ophthalmological surgery method for treating presbyopic in a patient's eye by ablating the sclera in accordance with claim **1** in which the step of selecting a pulsed ablation laser includes selecting a pulsed gas laser having a pulse duration shorter than 200 nanoseconds.

**6**. A laser beam ophthalmological surgery method for treating presbyopic in a patient's eye by ablating the sclera in accordance with claim **1** in which said the step of selecting a beam spot controller includes selecting a pulsed ablative laser having a focusing lens with focal length of between 10 and 100 cm selected to obtain a predetermined laser beam spot size having a diameter of between 0.1 and 0.8 mm on the corneal surface.

**7**. A laser beam ophthalmological surgery method for treating presbyopic in a patient's eye by ablating the sclera in accordance with claim **1** in which the step of selecting a beam spot controller includes selecting beam spot controller having a focusing lens with cylinder focal length of between 10 and 100 cm to obtain a laser beam spot having a line size of about 0.1–0.8 mm ×3–5 mm on the corneal surface.

**8**. A laser beam ophthalmological surgery method for treating presbyopic in a patient's eye by ablating the sclera in accordance with claim **1** in which the step of selecting a scanning mechanism includes selecting a scanning mechanism having a pair of reflecting mirrors mounted to a galvanometer scanning mechanism for controlling said laser output beam into a predetermined pattern.

**9**. A laser beam ophthalmological surgery method for treating presbyopic in a patient's eye by an ablating laser beam in accordance with claim **1** in which said ablative laser is delivered to the surface of the cornea by an optical fiber.

10. A laser beam ophthalmological surgery method for treating presbyopic in a patient's eye by ablating the sclera in accordance with claim 1 in which the step of selecting a scanning mechanism includes selecting a hand-held optical fiber coupled to the ablation laser for scanning said laser output beam into a predetermined pattern.

11. A laser beam ophthalmological surgery method for treating presbyopic in a patient's eye by ablating the sclera in accordance with claim 1 in which the predetermined pattern is generated by the steps of:

selecting a metal mask having at least one slit therein; and

positioning the selected mask over the cornea surface for scanning the ablation laser thereover for controlling the ablation slit pattern on the sclera tissue outside the limbus.

12. A laser beam ophthalmological surgery method for treating presbyopic in a patient's eye by ablating the sclera in accordance with claim 1 in which said predetermined pattern includes at least 3 radial lines around the area of the cornea outside the limbus.

13. A laser beam ophthalmological surgery method for treating presbyopic in a patient's eye by ablating the sclera in accordance with claim 1 in which said predetermined pattern includes a ring pattern around the area of the cornea outside the limbus.

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